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Franciscus, Johanus [NL/NL]; Ginderover 33, NL-5591  
JM Heeze (NL). DINGS, Franciscus, Cornelius [NL/NL];  
Kapelstraat Noord 129, NL-5502 CC Veldhoven (NL).

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(74) Agent: PRINS, A.W.; NIEUWE PARKLAAN 97,  
NL-2587 BN DEN HAAG (NL).

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(71) Applicant (*for all designated States except US*): OTB  
GROUP B.V. [NL/NL]; Luchthavenweg 10, NL-5657 EB  
Eindhoven (NL).

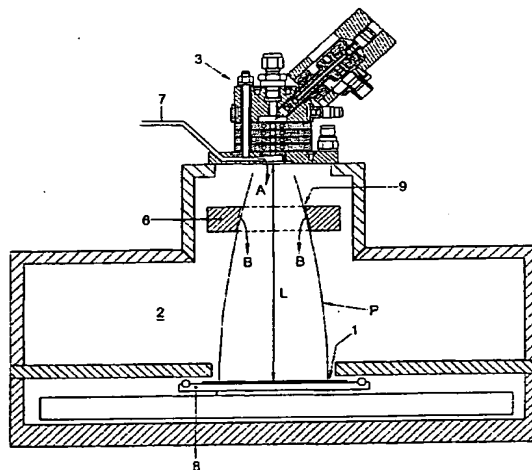
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(72) Inventors; and

(75) Inventors/Applicants (*for US only*): BOXHOORN,  
Gosse [NL/NL]; Bongard 3, NL-6393 CH Wijnandsrade  
(NL). BIJKER, Martin, Dinant [NL/NL]; Betuwelhof  
64, NL-5709 KR Helmond (NL). EVERS, Marinus,

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR MANUFACTURING A CATALYST



(57) Abstract: A method for manufacturing a catalyst, wherein a substrate (1) is introduced into a processing chamber (2, 102); wherein at least one plasma (P) is generated by at least one plasma cascade source (3, 103); wherein at least one deposition material (A, B) is deposited on the substrate (1, 101) under the influence of the plasma (P). The invention further provides an apparatus for manufacturing a catalyst, the apparatus being provided with at least one plasma cascade source (3, 103) for generating at least one plasma (P), the apparatus comprising means for bringing deposition material (A, B) into each plasma (P), the apparatus being further provided with substrate positioning means (8, 118) to bring and/or keep at least a part of a substrate (1, 101) in such a position in a processing chamber (2, 102) that the substrate (1, 101) makes contact with the plasma (P).

# INTERNATIONAL SEARCH REPORT

PCT/NL 03/00462

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B01J37/02 B01J37/34 C23C4/12 C23C14/34 C23C16/44

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 196 10 015 A (HOECHST AG) 18 September 1997 (1997-09-18) cited in the application  figures 1,2 example 1	1,5,8,9, 14-20, 22-26, 28,35, 42,43,49
X	EP 1 034 843 A (SULZER METCO AG ;SULZER CHEMTECH AG (CH)) 13 September 2000 (2000-09-13) cited in the application  paragraph '0009! - paragraph '0024! figures 1,4-6  -/--	1,8,9, 14-19, 22-26, 28,35, 42,43,49

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Zuurdeeg, B

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BRAULT P ET AL: "The use of plasmas in catalysis: catalyst preparation and hydrogen production" ANNALES DE CHIMIE - SCIENCE DES MATERIAUX., vol. 26, no. 4, July 2001 (2001-07), pages 69-77, XP004341615 MASSON ET CIE. PARIS., FR cited in the application paragraaf 2.	1,2,6-8, 14,22, 28, 35-37, 49,50
X	WO 01 32949 A (ELLINGHORST GUIDO ;BAALMANN ALFRED (DE); BUSKE CHRISTIAN (DE); FOE) 10 May 2001 (2001-05-10) cited in the application the whole document	1-4,8,9, 15,18, 22,26, 35,39
A	WO 01 96234 A (CONOCO INC) 20 December 2001 (2001-12-20) cited in the application	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

PCT/NL 03/00462

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 19610015	A	18-09-1997	DE 19610015 A1	18-09-1997
			AT 181967 T	15-07-1999
			DE 59602394 D1	12-08-1999
			DK 815280 T3	31-01-2000
			WO 9629443 A1	26-09-1996
			EP 0815280 A1	07-01-1998
			ES 2135884 T3	01-11-1999
			GR 3031268 T3	31-12-1999
			JP 11505292 T	18-05-1999
EP 1034843	A	13-09-2000	EP 1034843 A1	13-09-2000
			JP 2001038228 A	13-02-2001
WO 0132949	A	10-05-2001	DE 29919142 U1	08-03-2001
			WO 0132949 A1	10-05-2001
			EP 1230414 A1	14-08-2002
			JP 2003514114 T	15-04-2003
WO 0196234	A	20-12-2001	AU 6985401 A	24-12-2001
			CA 2411854 A1	20-12-2001
			EP 1289879 A2	12-03-2003
			WO 0196234 A2	20-12-2001
			US 2002035036 A1	21-03-2002